

WORLDWIDE EMERGING ENVIRONMENTAL ISSUES AFFECTING THE U.S. MILITARY
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Note to Readers: Pages 1-12 comprise the summary and analysis of this report. Expanded details for some items are in the Appendix beginning on page 13.

Item 1. Global Warming Goes to Court.....	1
Item 2. International Conference and Assessments Find Rising Ocean Pollution.....	1
Item 3. Civil Society Regional Consultations around the World.....	2
Item 4. Technological Breakthroughs with Environmental Security Implications.....	3
4.1 Printing Fuel Cells.....	3
4.2 New Production Technique for Nanofiber Filters for Chemical Warfare Protection.....	3
4.3 Sugar-coated Nanotubes Stop Anthrax Inhalation.....	3
4.4 Ultrasound Soil Cleanup Technique.....	4
Item 5. Updates on Previously Identified Issues.....	4
5.1 Climate Change.....	4
5.1.1 Increasing Weather Extremes and Environmental Refugees due to Climate Change.....	4
5.1.2 Ozone Hole Worst Ever Recorded.....	4
5.1.3 Economic and Security Implications of Climate Change.....	5
5.1.4 Possible Tougher Policies Concerning Climate Change.....	5
5.2 Global Facility for Disaster Reduction and Recovery to Mitigate Impact of Natural Disasters..	6
5.3 New EU Environmental Policies.....	6
5.3.1 EU New Directive on Air Pollution.....	6
5.3.2 EU to Increase Environmental Regulations Enforcement.....	6
5.3.3 European Action Plan on Energy Efficiency.....	7
5.4 Nanotechnology Risk Assessment and Health Impacts.....	7
5.4.1 Scientists Correlate Nanoparticle Structure and Toxicity.....	7
5.4.2 Australian New Report and Research Group on Nanotechnology.....	7
5.4.3 Conferences Addressing Nanotechnology Safety Issues.....	8
5.5 Global Pandemic Containment Efforts.....	8
5.5.1 FAO Launched New Crisis Management Centre.....	8
5.5.2 WHO-sponsored pandemic flu task force holds first meeting in Geneva.....	9
5.6 New Sites Added to World's Protected Biosphere Reserves.....	9
Item 6. Reports Suggested for Review.....	10
6.1 <i>Living Planet Report 2006</i>	10
6.2 New Predictions for the Atmosphere by 2030.....	10
6.3. New Publications on Nanotechnology.....	11
6.3.1 Nanomaterials Handbook.....	11
6.3.2 Characterising the potential risks posed by engineered nanoparticles.....	11
6.3.3 Review of Safety Practices in the Nanotechnology Industry.....	11
6.4 <i>Switching to Green: A renewable energy guide for office and retail companies</i>	12
Appendix.....	13

Item 1. Global Warming Goes to Court

The New Zealand High Court has ruled that climate change factors can be considered during Greenpeace's upcoming appeal against the proposed Marsden B coal-burning power station. Greenpeace appealed the permission granted to the Marsden B power station to start burning coal, on grounds of environmental and mainly climate change consequences. Although this ruling is limited to New Zealand and to a specific industry, it creates a precedent with effects likely to be felt in other jurisdictions and sectors. In November, the U.S. Supreme Court will hear the case of *Massachusetts v. Environmental Protection Agency* (case 05-1120) filed by twelve states and several cities on EPA's role to regulate CO₂ as a greenhouse gas pollutant under the Clean Air Act. Over 16 other litigations are pending in U.S. federal and state courts against companies whose emissions are linked to global warming; more are expected to come. Swiss Re, the world's largest reinsurance company, estimates that the annual liability costs of global warming will be \$150 billion dollars per year within ten years.

Military Implications:

Lawsuits may one day be filed against the military for its greenhouse gas emissions. The sooner military efforts to reduce greenhouse gas emissions are fully compliant with "best practices", the less likely the military will be sued for damages. The military should be prepared for more stringent decisions and regulations worldwide against atmospheric emissions. These remarks are offered in realization that the U.S. military may already be among the institutions most compliant with greenhouse gas emission standards, but that good might not be good enough in coming years.

Sources: [see a more complete list of sources in the [Appendix](#)]

Marsden B - A Bad Idea

<http://www.greenpeace.org.nz/campaigns/climate/MarsdenB.asp>

Update: Massachusetts v. EPA

http://www.treehugger.com/files/2006/10/massachusetts_v_epa.php

Global Warming: Here Come The Lawyers

http://www.businessweek.com/magazine/content/06_44/b4007044.htm

Climate Security: Risks and Opportunities for the Global Economy

http://www.cfr.org/publication/11511/climate_security.html

Item 2. International Conference and Assessments Find Rising Ocean Pollution

The Second Intergovernmental Review (IGR-2) meeting of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA) attended by over 700 participants from some 115 countries was held in Beijing, October 16-20. The delegates assessed progress so far and the main issues concerning ocean pollution, and addressed the actions needed for the next period 2007-2011. Although no legally binding instruments were adopted, "soft law" timetables and measures offering more flexibility and adaptability to countries' and regions' specifics were discussed. New scientific estimates released at the meeting reveal that due to pollution, the number of marine 'dead zones' or low oxygenated areas may have reached 200, threatening fish stocks and the livelihood of people who depend on fisheries. And, an estimated 16% of the world's coral reefs suffered up to 90% mortality. UNEP new report, *The State of the Marine Environment: Trends and Processes*, is a comprehensive assessment of pollution evolution

and trends, warning of critical areas and suggesting recommendations to improve control and reduce contamination caused mainly by discharge of untreated wastewater. The report also notes that the number of coastal dead zones has doubled every decade since 1960, and that coastal ecosystems will be further endangered by rising populations in those areas. Highly populated East Asia discharges 90% of its untreated sewage into water. The Beijing Declaration on Furthering the Implementation of the GPA will be submitted for endorsement to the next UNEP Governing Council/Global Ministerial Environment Forum in February 2007.

Military Implications:

Environmental surveillance and data analysis is improving the amount and quality of the information needed to help reduce marine pollution. In addition to improving its own environmental performance, the military should consider offering assistance in regions where pollution control is inadequate.

Sources: [see a more complete list of sources in the [Appendix](#)]

Integrated Water Management Key to Cleaning-up Oceans

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=486&ArticleID=5387&l=en>

The State of the Marine Environment: Trends and Processes

[http://www.gpa.unep.org/document_lib/en/pdf/report2-webversion_\(global_soe\).pdf](http://www.gpa.unep.org/document_lib/en/pdf/report2-webversion_(global_soe).pdf)

Further Rise in Number of Marine ‘Dead Zones’

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=486&ArticleID=5393&l=en>

Item 3. Civil Society Regional Consultations around the World

In preparation for the 8th Global Civil Society Forum (GCSF) and the 24th session of the Governing Council/Global Ministerial Environment Forum (GC-24/GMEF) to be held in Nairobi, Kenya, in February 2007, representatives of major groups of civil society held regional consultations around the world. The European Regional Consultation took place in Geneva, October 23–25, and the African Civil Society meeting was held in Nairobi, October 26–27. The discussions were structured around the February GCSF’s central themes—globalization and environment, and UN Reform—with focus on such regional aspects as water, chemicals management, sustainable procurement policies and practices, and international and regional processes.

Military Implications:

Review of the outputs of those recent meetings and subsequent discussions provides an important heads up on the agenda and issues to be discussed and the potential for new environment-related regulations likely to arise in the UNEP February 2007 Forum. If military cooperation with environmental NGOs is likely to increase, then a review of the positions of various NGOs in these meetings could provide information for deciding which environmental NGOs to cooperate with about what, and where in the world.

Sources:

Civil Society Regional Consultations Take Off in Geneva

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=392&ArticleID=5396&l=en>

Civil Society Regional Consultations Take Off in Nairobi

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=392&ArticleID=5398&l=en>

Item 4. Technological Breakthroughs with Environmental Security Implications

4.1 Printing Fuel Cells

EoPlex Technologies, in Redwood City, CA has developed a process, which allows the printing of three-dimensional structures with "ink" containing various materials, such as polymers, metals, and ceramics, layer by layer. Microreactors for chemical and drug processing, miniature fuel cells, wireless sensors, and thermal management systems are just some of the envisioned applications of this technology able to cheaply and easily create microscale devices.

Military Implications:

The military should consider investigating how this versatile technology could be useful for creating microscale devices (e.g. to fabricate fuel cells for recharging communication or other devices used in field operations), and hence reduce greenhouse gas emissions and other pollution. The technology could be adaptable for biological and chemical analysis.

Source:

Printing Fuel Cells

http://www.technologyreview.com/read_article.aspx?id=17626&ch=energy

4.2 New Production Technique for Nanofiber Filters for Chemical Warfare Protection

A new 3D honeycomb structure of polymer nanofibers, which, when incorporated into protective gear, would be much more efficient in adsorbing and possibly destroying dangerous chemical warfare agents in the environment was developed by scientists led by Dr. Seshadri Ramkumar, Asst. Prof. at the Institute of Environmental and Human Health at Texas Technology University.

Military Implications:

The military should follow this development and its applicability to protect the personnel exposed to a chemically hazardous environment. The materials might also be useful for protecting hazardous material and wastes handlers.

Source:

Nanofilter suit for chemical warfare

<http://www.hindu.com/seta/2006/10/12/stories/2006101200611500.htm>

4.3 Sugar-coated Nanotubes Stop Anthrax Inhalation

Clemson University chemist Ya-Ping Sun and his team have developed a technique that uses sugarcoated carbon nanotubes to render weaponized anthrax harmless. Finely divided anthrax spores in the environment bind to the sugar coating, forming clusters too large to be inhaled, rendering the weapon useless. [See also *Sugar-Coated Gold Nanoparticles Detect Toxins* in April 2006 environmental security report]

Military Implications:

If not already done so, the military should follow this development for eventual field applicability.

Source:

Clemson Researchers Develop Nanotechnology to Stop Weaponized Anthrax in Its Tracks

http://clemsonews.clemson.edu/WWW_releases/2006/October/anthrax.html

4.4 Ultrasound Soil Cleanup Technique

Researchers at CSIRO Industrial Physics near Sydney, Australia have shown that high-intensity ultrasound can destroy toxic or carcinogenic persistent organic pollutants (POPs) that commonly contaminate land. According to *New Scientist*, "Cleaning them up is difficult. Incineration can produce toxic breakdown products, while chemical treatment methods can require huge amounts of energy or involve substances almost as toxic as those being cleaned up – risking dangerous leakages." The new technique, which avoids those problems, mixes the soil with water and then passes it through a chamber where the ultrasound produces localized temperatures of 4000° C and pressures of 1000 atmospheres, destroying up to 97% of the contaminants in a few minutes.

Military Implications:

A scaled down and portable version of this system might have good field applicability for post-conflict and installation cleanup.

Source:

Treating toxic waste with sound waves

<http://www.csiro.au/csiro/content/standard/ps9b,..html>

Item 5. Updates on Previously Identified Issues

5.1 Climate Change

5.1.1 Increasing Weather Extremes and Environmental Refugees due to Climate Change

There might be 200 million climate refugees by 2050, which could increase the likelihood of conflicts in many locations around the world. Experts warn that in addition to the South Pacific low-lying islands that are already affected, millions of people in densely populated countries such as Bangladesh and parts of China, Indonesia, and Vietnam might be forced to move by rising sea levels, while extreme drought might affect 10% of world land by 2050—five times more than now, and 30% by the end of the century (estimate by UK Met Office Hadley Centre). Another study, *Going to the Extremes*, based on advanced computer modeling, warns that by the century's end, the planet will face more weather extremes such as deadly heat waves, prolonged drought, and intense rainstorms due to global warming caused by human emissions of greenhouse gas.

5.1.2 Ozone Hole Worst Ever Recorded

In addition to pollution, climate change is increasingly recognized as a cause for upper atmosphere ozone depletion. A new UN report revealing continuous ozone depletion, notes that this year's Antarctic ozone hole covered 29.5 million square kilometers and the ozone mass deficit was 40 million tonnes (European space Agency, ESA, measurements on October 2), the largest ever recorded. The assessment is based on a compilation of data provided by NASA and the ESA, and observations by the WMO Global Atmosphere Watch (GAW) ozone network. Scientists warn that the trend might continue for the next two decades unless measures are taken to curb climate change and diminish levels of ozone destroying substances in the atmosphere, and countries generally adhere to and enforce the Montreal Protocol and Vienna Convention on phasing out of ozone-destroying chemicals. At a Montreal Protocol meeting, held in New Delhi, October 28-November 3, UNEP will be presenting a 10-year road map for governments to follow in protecting the ozone layer.

5.1.3 Economic and Security Implications of Climate Change

The Economics of Climate Change, an authoritative report by Sir Nicholas Stern, former chief economist with the World Bank, warns that unless rapid action is taken globally to reduce emissions and tackle climate change within a decade, the world will face deep economic recession, with annual costs of climate change consequences ranging between 5% to 20% of the global economic output (about £3.68 trillion--approx. \$7 trillion US dollars). The report calls for a global framework on climate change that is flexible—considering different countries'/regions' specifics. Another report, *Africa—Up in Smoke 2*, by a coalition of UK aid agencies and environmental groups warns that climate change might annihilate efforts to tackle poverty in Africa and emphasizes the need for human progress and development models that are *climate proof* and *climate friendly*. Africa is already 0.5°C warmer than it was 100 years ago and temperature increases over many areas of Africa might be double the global average increase, worsening drought patterns and the strain on already feeble water resources, and therefore aggravating the security situation of the conflict-torn continent. As noted by UK Foreign Secretary, Margaret Beckett, climate change is not any longer just an environmental problem, but is “a defence problem. It is a problem for those who deal with economics and development, conflict prevention, agriculture, finance, housing, transport, innovation, trade and health.”

5.1.4 Possible Tougher Policies Concerning Climate Change

Environment ministers from around the world will meet next month (November 2006) in Nairobi, Kenya, for talks on post-Kyoto policies. Some want clearer timetables and frameworks on the next phase of greenhouse gases cuts. German Chancellor Angela Merkel wants to make addressing climate change a top priority on the agenda as she assumes the top position in both the G8 and the EU in 2007. She also wants to use Germany's presidency of the EU to push for the reduction of energy use, including bringing around the big greenhouse gases emitters that do not yet have adequate reduction policies.

Military Implications:

[Similar to previous on the same issue] There is compelling evidence of the consequences of anthropogenic climate change, and a growing world demand for action. The military should continue to accelerate efforts to reduce their own greenhouse gas emissions. New international environmental security-related policies and cooperation to avoid potentially large-scale disasters and conflicts seem inevitable.

Sources: [see a more complete list of sources in the [Appendix](#)]

INTERVIEW - Refugees, Disease Big Risk from Global Warming – UN

<http://www.planetark.com/dailynewsstory.cfm/newsid/38588/story.htm>

Feeling the Heat, report by Tearfund, member of the Disasters Emergency Committee

<http://www.tearfund.org/webdocs/Website/News/Feeling%20the%20Heat%20Tearfund%20report.pdf>

Expect a Warmer, Wetter World this Century, Computer Models Agree

<http://www.ucar.edu/news/releases/2006/wetterworld.shtml>

Antarctic ozone hole is worst ever recorded, UN reports

<http://www.un.org/apps/news/story.asp?NewsID=20108&Cr=Ozone&Cr1=>

Stern Review sets out economic imperative of climate change

http://www.wwf.org.uk/news/n_0000003037.asp

Dangerous climate change is hitting Africa hard say top aid and environment groups

<http://www.neweconomics.org/gen/africaupinsmoke.aspx>

Merkel to Target Climate Change as G8, EU Leader

<http://www.dw-world.de/dw/article/0,2144,2188336,00.html>

5.2 Global Facility for Disaster Reduction and Recovery to Mitigate Impact of Natural Disasters

The Global Facility for Disaster Reduction and Recovery, set up by the UN International Strategy for Disaster Reduction in cooperation with the World Bank, is a new initiative aiming to improve preparatory and recovery actions to lower the risks and consequences of natural disasters. The Facility will mainly ensure that disaster risk reduction is considered a priority in development projects in countries at risk, and will provide expertise and technical assistance for including risk reduction in strategic planning. The World Bank Global Hotspots Study identifies 86 vulnerable countries with risks of high mortality and economic loss. [See also *ICSU Launched Global Disaster Research Program* in October 2005, and *New Developments for Addressing Natural Disasters* in July 2005 environmental security reports.]

Military Implications

This new entity provides one more point of coordination and information sharing for military disaster support planners.

Sources: [see a more complete list of sources in the [Appendix](#)]

World Bank-ISDR partnership to promote resilience of nations and communities to disasters

<http://www.unisdr.org/eng/media-room/press-release/2006/pr-2006-10-WB-ISDR-partnership.pdf>

5.3 New EU Environmental Policies

5.3.1 EU New Directive on Air Pollution

A new air quality directive approved by the Environment Council is fixing an annual concentration limit for fine dust particles (known as PM2.5) to 25 micrograms per cubic meter averaged over a year, with effect from 1 January 2015 and will require Member States to reduce people's exposure to this group of particles by 20% between 2010 and 2019. The new directive would not change existing air quality standards for other pollutants but would give Member States more flexibility in meeting some of these in zones where they face difficulties. [See also *EU Thematic Strategy on Air Pollution for the CAFE Programme* in September 2005, and *The European Union Environmental Initiatives* in January 2005 environmental security reports.]

5.3.2 EU to Increase Environmental Regulations Enforcement

The European Commission intends to increase the enforcement of environmental regulations by introducing criminal sanctions for serious environmental offences. In light of last month's Ivory Coast incident of toxic waste dumping, it aims to strengthen enforcement of the EU Waste Shipment Regulation and improve international cooperation to prevent illegal waste shipments. The issue will be addressed at the next Basel Convention conference to be held in Nairobi, November 27-December 1, 2006. [See also *Toxic Waste Disposal of Global Growing Concern* in September 2006, as well as *Basel Convention on Hazardous Wastes to be Made More Effective* in July 2005 and other related items in previous environmental security scanning reports.]

5.3.3 European Action Plan on Energy Efficiency

The European Commission outlined its Energy Efficiency Action Plan (EEAP) to cut Europe's energy consumption by 20% before 2020. It includes over 75 measures including new energy efficiency standards, and more energy-efficient products and services. The action plan will be introduced over the next six years and targets several priority areas, including: energy-efficiency labeling, possible legislation for meeting car emissions targets; encouraging investment in energy efficiency; more efficient power plants and energy transmission systems; and energy saving taxes and incentives. [See also *New European Energy Policy Developments* in March 2006 environmental security report.]

Military Implications:

The military should consider following the EU new environmental regulations and new standards policies and the consequently emerging strategies, to ensure that its activities in the region comply with the new requirements.

Sources:

Commission welcomes Council agreements on air quality directive, hazardous waste

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/06/1447&format=HTML&aged=0&language=EN&guiLanguage=en>

Climate Change and Air Quality: Press Statement at the Environment Council

<http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/06/624&format=PDF&aged=0&language=EN&guiLanguage=en>

Preparation Environment Council, 23 October 2006

<http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/06/389&format=HTML&aged=0&language=EN&guiLanguage=en>

Saving 20% by 2020: European Commission unveils its Action Plan on Energy Efficiency

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/06/1434&format=HTML&aged=0&language=EN&guiLanguage=en>

5.4 Nanotechnology Risk Assessment and Health Impacts

5.4.1 Scientists Correlate Nanoparticle Structure and Toxicity

Andre Nel and his team at UCLA's Johnson Cancer Center have been investigating the relationships between the structural characteristics of nanoparticles and their toxicity. According to *Meridian Nanotechnology and Development News*, this work "contributes to efforts to identify key factors or tests that can be used to predict toxicity, permit targeted screening, and allow materials scientists to generate new, safer nanoparticles with this structure-toxicity information in mind.... [They] found that ambient particles and positively charged polystyrene spheres generated high levels of reactive molecules, and induced oxidative stress in defense cells from the lung called macrophages. Little activity was observed for carbon black, titanium dioxide, and negatively charged polystyrene spheres."

5.4.2 Australian New Report and Research Group on Nanotechnology

Options for a National Nanotechnology Strategy, a report by an Australian federal government taskforce, outlines the establishment of a national nanotechnology office and a public awareness campaign on the potential social and ethical implications of nanotechnology. The report notes the insufficient information about the potential health risks of nanoparticles and calls for more research

on toxicity and occupational and environmental risks. NanoSafe Australia is a new group of nanotechnology toxicologists formed for investigating risks associated to nanoparticles use and handling.

Military Implications:

The military should follow these efforts and use the results to aid in environmental risk assessment and health education for new nanomaterials.

Source:

Nanotoxicology: Signs of stress

<http://www.nature.com/nnano/journal/v1/n1/full/nnano.2006.69.html>

Options for a National Nanotechnology Strategy Report

<http://www.industry.gov.au/content/itinternet/cmscontent.cfm?objectID=E2FE4F8A-4E44-4785-A6A01BE137E0E524>

NanoSafe Australia Newsletter

<http://cohesion.rice.edu/CentersAndInst/ICON/emplibary/NanoSafeAustNewsletter1-Aug2006.pdf>

Nanotechnology - it's a small, small world

<http://www.smh.com.au/news/science/nanotechnology--its-a-small-small-world/2006/10/04/1159641392822.html>

5.4.3 Conferences Addressing Nanotechnology Safety Issues

EU Conference on Nanotechnology Safety Policies

The current Finnish Presidency of the EU held a conference, Nanotechnologies - Safety for Success, in Otaniemi, Finland on 14-15 September 2006, with the goal of facilitating a dialogue on the opportunities and concerns presented by nanotechnologies. Another objective was the development of specific safety recommendations for the application of nanotechnologies. The conference was attended by 180 experts from 20 countries. The presentations, covering the key actions for efficient and well-coordinated policies, are available on the conference's Web site.

International Nanotech Conference to be Held in Egypt, March 2007

An international conference, NanoTech Insight 2007 will be held in Luxor, Egypt, 10-17 March 2007, to discuss the latest trends and discoveries in nanoscience. Topics will include scientific and technical developments, applications, and ethical and environmental impacts.

Military Implications:

Military personnel concerned with nanotech safety should consider the results of these meetings for eventual inputs and the latest developments in nanotechnology and its health and environmental implications.

Sources:

Finland Conference site: <http://www.fmmt.fi/ntss>

Egypt Conference site: <http://www.nanoinsight.net>

5.5 Global Pandemic Containment Efforts

5.5.1 FAO Launched New Crisis Management Centre

In collaboration with the World Organisation for Animal Health, the UN Food and Agriculture Organization launched a new Crisis Management Centre to fight avian influenza outbreaks and other major animal health or food health-related emergencies. The center continuously monitors disease information around the globe and is able to respond in less than 48 hours, when a suspected

outbreak is reported. [See also *Bird Flu Spreads Increasing Threats of a Human Pandemic* in February 2006 and other previous environmental security reports on this issue.]

5.5.2 WHO-sponsored pandemic flu task force holds first meeting in Geneva

The Ad Hoc Influenza Pandemic Task Force held its first meeting to discuss best actions in case of an outbreak. The Task Force is providing independent risk assessments and advising WHO on possible measures to be taken. These could include rapid containment effort, warning governments of risks and accelerating vaccine production. The Task Force includes 21 experts and will function until June 15, 2007, when WHO's revised International Health Regulations come into effect.

Military Implications:

[Similar to previous on the same issue] The military should continue collaboration with these centers to strengthen military-to-military assistance and training in fighting pandemics, to become more globally integrated and for assisting in planning and performing emergency actions, if needed.

Sources:

New Crisis Management Centre launched by FAO

<http://www.fao.org/newsroom/en/news/2006/1000421/index.html>

WHO-sponsored pandemic flu task force holds first meeting in Geneva

http://www.iht.com/articles/ap/2006/09/26/europe/EU_MED_UN_Pandemic_Task_Force.php

5.6 New Sites Added to World's Protected Biosphere Reserves

UNESCO added 25 new sites to the UN global network of protected biosphere reserves that are managed on sustainable development principles. The new additions include 18 sites in Mexico, three in Spain, one trans-boundary site shared between Spain and Morocco, and one in each of the Russian Federation, Viet Nam, and Malawi. UNESCO's network Man and the Biosphere (MAB) Programme now comprises 507 reserves in 102 countries. [See also *New Protected Ecological Sites* in July 2005 and other previous environmental security reports.]

Military Implications:

[Similar to previous on the same issue] The military should keep up-to-date with the list of protected sites and plan any operations near them accordingly. Citing the Army's new *Strategy for the Environment*, the military should seek new opportunities to participate in dialogues among scientists, politicians, environmental NGOs, and economic decision-makers for improving biodiversity management strategies as well as in planning its own operations.

Source:

Twenty-five biosphere reserves added to UNESCO's Man and the Biosphere (MAB) Network

http://portal.unesco.org/en/ev.php-URL_ID=35389&URL_DO=DO_TOPIC&URL_SECTION=201.html

Item 6. Reports Suggested for Review

6.1 Living Planet Report 2006

Living Planet Report 2006, by the WWF and the Global Footprint Network, reveals that humanity's impact on the planet has more than tripled since 1961 and Earth's resources are being used faster than they can be replaced by nature, and it warns that, if present trends continue, by 2050 humanity

will demand twice as much as the planet can supply. The report breaks down the ecological footprint into components, such as CO₂, food production needs, infrastructure requirements, etc. The countries with the highest ecological footprint are: the United Arab Emirates, U.S., Finland, Canada, Kuwait, Australia, Estonia, Sweden, New Zealand, Norway and Denmark.

Military Implications:

This report should be studied by those with responsibilities for implementing the Army's *Strategy for the Environment*. This report is another addition in the long series warning on humanity's unsustainable practices. It is expected that pressure to improve performance will increase mostly on the countries that top the ecological footprint list.

Sources:

Living Planet Report 2006 outlines scenarios for humanity's future

http://www.footprintnetwork.org/newsletters/gfn_blast_0610.html

"Living Planet Report 2006" http://www.ourplanet.com/imgversn/footprint/living_planet_report.html

6.2 New Predictions for the Atmosphere by 2030

Research funded by the EU network ACCENT assessed the state of the global atmospheric environment and evaluated the likely changes by 2030 in conjunction with current regulations. It presents three scenarios: Current Legislation Scenario—based on current air quality legislation; the Maximum technically Feasible Reduction scenario—based on implementation of technological breakthroughs to achieve maximum emissions reduction; and the Intergovernmental Panel on Climate Change (SRES-A2) scenario--- a relatively pessimistic approach is shown in contrast to the two more optimistic scenarios. The results suggest that current international legislation on air pollutant emissions is not adequate to reduce ozone and ecosystem damage (mainly caused by elevated nitrogen pollution.)

Military Implications:

Since these scenarios help identify and understand gaps in current legislation, they may also become the basis for new international regulations and technological applications affecting the military.

Source:

New Predictions for the Global Atmospheric Environment by 2030

<http://ec.europa.eu/environment/integration/newsalert/pdf/37na4.pdf>

6.3. New Publications on Nanotechnology**6.3.1 Nanomaterials Handbook**

A new 780-page *Nanomaterials Handbook* has been published by CRC Press. With 27 chapters by 62 authors, this encyclopedic work thoroughly covers the field, and received a very favorable review in *Nature*. The only significant criticism was its lack of almost all 2005 and later work (a type of problem difficult to avoid in a very large compendium in a rapidly advancing field).

Military Implications:

Military personnel with an interest in nanotech and related subjects might find this handbook useful due to its broad perspectives on the domain.

Sources:

Nanomaterials Handbook. Yury Gogotsi, Drexel University, Philadelphia, Pennsylvania

http://www.crcpress.com/shopping_cart/products/product_detail.asp?sku=2308&pc=/shopping_cart/categories/categories_products.asp?parent_id=1174

Book Review: <http://www.nature.com/nnano/journal/v1/n1/full/nnano.2006.64.html>

6.3.2 Characterising the potential risks posed by engineered nanoparticles

Characterising the potential risks posed by engineered nanoparticles—UK Government research—a progress report by the UK Department for Environment, Food and Rural Affairs (DEFRA), covers the work of five Task Forces: Metrology, Characterisation, Standardisation and Reference Materials; Exposures – Sources, Pathways, and Technologies; Human Health Hazard and Risk Assessment; Environmental Hazard and Risk Assessment; and Social and Economic Dimensions of Nanotechnologies. According to the DEFRA announcement, the report includes details of the UK's action plans and assesses progress made towards meeting the 19 research objectives presented in the 2005 report.

6.3.3 Review of Safety Practices in the Nanotechnology Industry

A Review of Safety Practices in the Nanotechnology Industry - Phase One Report: Current Knowledge and Practices Regarding Environmental Health and Safety in the Nanotechnology Workplace was prepared for the International Council on Nanotechnology by the University of California, Santa Barbara. According to the press release, the report “offers a review and analysis of existing efforts to develop 'best practices'” but “finds that efforts to catalogue workplace practices have not systematically documented current environment, health and safety practices in a variety of workplace settings and geographies.”

Military Implications:

Military personnel concerned with nanotech safety should review these reports for insights on nanotech environmental risk assessment.

Sources:

Characterising the potential risks posed by engineered nanoparticles

<http://www.defra.gov.uk/environment/nanotech/research/reports/progress-report061019.pdf>

A Review of Safety Practices in the Nanotechnology Industry - Phase One Report

http://cohesion.rice.edu/CentersAndInst/ICON/emplibary/Phase%20I%20Report_UCSB_ICON%20Final.pdf

Press release: www.icon.rice.edu

6.4 Switching to Green: A renewable energy guide for office and retail companies

The World Resources Institute (WRI) published a guidebook, *Switching to Green: A renewable energy guide for office and retail companies*, to provide organizations with easily understandable information on how to switch to renewable energy.

Military Implications:

The military should make this available to those with responsibilities for increasing the use of renewable energy sources and promoting the *Army Strategy on the Environment*.

Source:

Switching to Green: A renewable energy guide for office and retail companies

http://www.wri.org/climate/pubs_description.cfm?pid=4250

APPENDIX

Reference Details

This Appendix contains expanded background information on some items.

Item 1. Global Warming Goes to Court

A more complete list of sources:

Court affirms Greenpeace Marsden B rights

<http://www.scoop.co.nz/stories/print.html?path=PA0610/S00224.htm>

Marsden B - A Bad Idea

<http://www.greenpeace.org.nz/campaigns/climate/MarsdenB.asp>

Update: Massachusetts v. EPA

http://www.treehugger.com/files/2006/10/massachusetts_v_epa.php

Supreme Court tackles global warming

http://money.cnn.com/2006/10/25/news/economy/pluggedin_gunther_epa.fortune

Global Warming: Here Come The Lawyers

http://www.businessweek.com/magazine/content/06_44/b4007044.htm

Item 2. International Conference and Assessments Find Rising Ocean Pollution

A more complete list of sources:

Integrated Water Management Key to Cleaning-up Oceans

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=486&ArticleID=5387&l=en>

Concern Over Oceans Despite Receding Oil & Chemical Threats

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=486&ArticleID=5364&l=en>

Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities

<http://www.gpa.unep.org/bin/php/home/index.php>

The State of the Marine Environment: Trends and Processes

[http://www.gpa.unep.org/document_lib/en/pdf/report2-webversion_\(global_soe\).pdf](http://www.gpa.unep.org/document_lib/en/pdf/report2-webversion_(global_soe).pdf)

Further Rise in Number of Marine 'Dead Zones'

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=486&ArticleID=5393&l=en>

Curbing Coastal Pollution Aids Recovery of Heat-Stressed Corals

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=486&ArticleID=5392&l=en>

Item 5. Updates on Previously Identified Issues

5.1 Climate Change

A more complete list of sources:

INTERVIEW - Refugees, Disease Big Risk from Global Warming – UN

<http://www.planetark.com/dailynewsstory.cfm/newsid/38588/story.htm>

Climate water threat to millions

<http://news.bbc.co.uk/2/hi/science/nature/6068348.stm>

Feeling the Heat, report by Tearfund, member of the Disasters Emergency Committee

<http://www.tearfund.org/webdocs/Website/News/Feeling%20the%20Heat%20Tearfund%20report.pdf>

Expect a Warmer, Wetter World this Century, Computer Models Agree

<http://www.ucar.edu/news/releases/2006/wetterworld.shtml>

Global Warming Could Spread Extreme Drought

<http://www.ens-newswire.com/ens/oct2006/2006-10-05-01.asp>

Tackle climate change or face deep recession, world's leaders warned

<http://www.guardian.co.uk/frontpage/story/0,,1931685,00.html>

Preparation Environment Council, 23 October 2006

<http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/06/389&format=HTML&aged=0&language=EN&guiLanguage=en>

Antarctic ozone hole is worst ever recorded, UN reports

<http://www.un.org/apps/news/story.asp?NewsID=20108&Cr=Ozone&Cr1=>

Record ozone loss during 2006 over South Pole

http://www.esa.int/esaCP/SEMQBOKKKSE_index_0.html

Ozone Depletion Crisis Not Yet Over

<http://www.ens-newswire.com/ens/oct2006/2006-10-27-08.asp>

UNEP Ozone Secretariat

http://ozone.unep.org/Treaties_and_Ratification/index.asp

Stern Review sets out economic imperative of climate change

http://www.wwf.org.uk/news/n_0000003037.asp

£3.68 trillion: The price of failing to act on climate change

http://observer.guardian.co.uk/uk_news/story/0,,1934381,00.html

British government report: global warming will devastate world economy

http://ca.news.yahoo.com/s/capress/britain_global_warming

Climate inaction 'has high cost'

<http://news.bbc.co.uk/2/hi/science/nature/5398784.stm>

Dangerous climate change is hitting Africa hard say top aid and environment groups

<http://www.neweconomics.org/gen/africaupinsmoke.aspx>

Africa—Up in Smoke 2. The second report on Africa and global warming from the Working Group on Climate Change and Development

http://www.neweconomics.org/gen/z_sys_PublicationDetail.aspx?pid=232

Merkel to Target Climate Change as G8, EU Leader

<http://www.dw-world.de/dw/article/0,2144,2188336,00.html>

5.2 Global Facility for Disaster Reduction and Recovery to Mitigate Impact of Natural Disasters

A more complete list of sources:

World Bank-ISDR partnership to promote resilience of nations and communities to disasters
<http://www.unisdr.org/eng/media-room/press-release/2006/pr-2006-10-WB-ISDR-partnership.pdf>

Global Facility for Disaster Reduction and Recovery

<http://www.unisdr.org/news/CFDRR-WB.doc>

Global Facility for Disaster Reduction and Recovery

<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTURBANDEVELOPMENT/EXTDISMGM/T/0,,contentMDK:21021166~menuPK:2848225~pagePK:210058~piPK:210062~theSitePK:341015,00.html>

Natural Disasters on the Rise, 2005 The Zenith Year

<http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:21085895~pagePK:34370~piPK:34424~theSitePK:4607,00.html>